



# Assessing the Impact of Health Education on Knowledge, Attitudes and Practices Regarding Rabies Prevention Amongst Dog Owners in Eastern Cape

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## ABSTRACT

Although rabies is a deadly contagious zoonotic disease, it is fully preventable through vaccination of dogs and health education. In this study, we sought to assess the impact of health education on the knowledge, attitudes and practices regarding rabies prevention and control by dog owners in rural and semi-urban communities in the Eastern Cape, South Africa. A quantitative, quasi-experimental, one-group, pre-post-test, research design was used. Pre and post-data were collected from 203 and 198 participants, respectively in a door-to-door strategy using a structured questionnaire. An educational intervention including pamphlets and posters with information on rabies was implemented. Data were analysed using dependent samples t-tests. The knowledge scores for pre-to and post-education intervention were 20.7% and 23.2%, attitude scores were 24.7% and 25.4%, respectively while practice remained unchanged at 25.0% for both pre and post-intervention. A statistically significant increase was observed in the Knowledge, Attitudes and Practices scores after the educational intervention ( $p < 0.001$ ), particularly concerning knowledge of rabies symptoms domain. The mean symptom scores pre and post-education intervention scored by the study population in all rabies symptoms were 23.92 ( $\pm 19.03$ ) and 36.14 ( $\pm 19.70$ ) respectively. A one-way ANOVA (Analysis of Variance) was performed to determine whether participants provided a statistically significant difference in the dog housing options; however, no statistically significant differences were found across the different housing options at  $p = 0.785$ . The educational intervention proved to be efficient in enhancing dog owners' knowledge, attitudes and practices concerning rabies prevention and control.

**Keywords:** Rabies; Health education; Knowledge; Attitudes and practices; Dog owners

## INTRODUCTION

Rabies is a serious zoonotic viral disease of the nervous system that presents both encephalitic and paralytic clinical forms [1]. A collective concern with rabies is the fact that it has existed for many years. It is among the major ailments that ever existed in documents with mad-like signs and symptoms. This disease was noticed to be transmissible to humans [2]. The infection in humans commonly occurs following a transdermal bite from an infected dog, but can also be transferred through scratching and/or licking by an infected dog [3,4]. Balcha et al., further stated that rabies infection was characterized by increased severity of nervous symptoms which leads to the inability and eventually resulting to the end of life [5].

Rabies alone is estimated to kill about 61,000 humans per annum worldwide [6]. Pastoret et al., and Monje et al., reported that the death toll from rabies was greater in Asia and Africa [7,8]. Most developed countries have eliminated or reduced rabies infections, in Europe, rabies remains only in wildlife reservoirs [9]. Part of the human population worldwide is living in risk areas where rabies in domestic dogs still exists; therefore, it is important to implement effective programmes to control and prevent human rabies transmission [9].

In South Africa, rabies is endemic amongst domestic animals such as canines, felines and wild animals including jackals, mongooses, ground squirrels, foxes and hyenas. There is,

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however, evidence that establishing increasing awareness through Information Education Communication (IEC) programmes has a positive effect on changing attitudes and practices and therefore minimizing the disease burden [10]. There are still research gaps in knowledge of rabies infection that require attention through health education interventions. There is little research being done to assess knowledge, attitudes and practices regarding rabies, despite the prevalence of 18 deaths in 2018 due to rabies within the communities situated in the Eastern Cape [11]. The present study, therefore, evaluated the impact of health education on knowledge, attitudes and practices regarding rabies control and prevention amongst dog owners in communities in Ngquza Hill Municipality, Eastern Cape Province, South Africa. There is no previous record as an indication of the implementation of educational intervention in the selected community [12,13].

## MATERIALS AND METHODS

The present study was designed as a quantitative, quasi-experimental study with a one-group pre and post-test research design. The selected site consists four locations or townships in the Ngquza Hill Municipality, a rural and semi-urban municipality in O.R Tambo district in the Eastern Cape province, South Africa. The study setting is occupied by small stalk farmers. Children below 18 years of age were excluded from the study; but household heads who owned dog and/or members of the family from 18-60 years old were included in the study in the case where the dog owner was not the head of the household.

In this area, most dog owners had between 1-5 dogs in a household and most of them were speaking isiXhosa, the local language. Dog owners were selected from the list of Animal Health technicians, who frequently work in the study area. Participants were recruited using a door-to-door strategy in the study area. Individuals were visited at their homes for a door-to-door sampling strategy. Random sampling was used to select 203 participants. The population of interest for this study was only household heads with dogs within the selected community.

Data was collected by the first author and trained independent field workers also signed a structured questionnaire *via* the interview method. The questionnaire consisted of four sections namely, section A (participant's profile and demography), section

B (participant's knowledge about rabies), section C (participant's attitudes related to rabies) and section D (participant's practices towards rabies prevention). The average scores for pre and post-intervention were calculated using the Microsoft Excel software system. The knowledge scores for the participants were computed by taking all the scores added up to get the sum of elements. That sum of elements was then divided by the number of items to get the average score. A similar approach was used to the attitudes and practices scores. The reliability of KAP (Knowledge, Attitudes and Practices) questions was assured because the questionnaire used in this study was adapted from those used in rabies KAP studies in other parts of Africa and worldwide [14-16]. After the pilot study had been conducted on 10 dog owners, a few changes were made to the questionnaire. All repeated questions were removed, while the categorization of the dog owner's age was not done in this study since it was not part of the study objectives.

The Information Education Communication (IEC) material used included the posters and pamphlets (Figure S1). This IEC materials was also adapted from the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) that was used for public health education purposes. The pamphlet was translated from English to isiXhosa and back-translation was done to ensure accuracy [12,13]. The IEC material was validated by the researcher and study supervisory team. It was then implemented in the study for two months. It was then implemented in the study for two months. Pamphlets and posters were distributed to participants immediately after pre-test data was obtained. The pre-data collection together with the health education process was conducted from March to September 2021.

The post-education intervention assessment was conducted after one month using the same questionnaire that was previously used to determine whether knowledge, attitudes and practices regarding rabies prevention and control had been gained by the communities. This post-data collection process took place between November 2021 and March 2022.

The intention was to allow for direct comparisons to assess the changes in KAP over time. No new participants were recruited for the survey after the initial registration. Figure 1 shows a flowchart of the data collection process for this study.

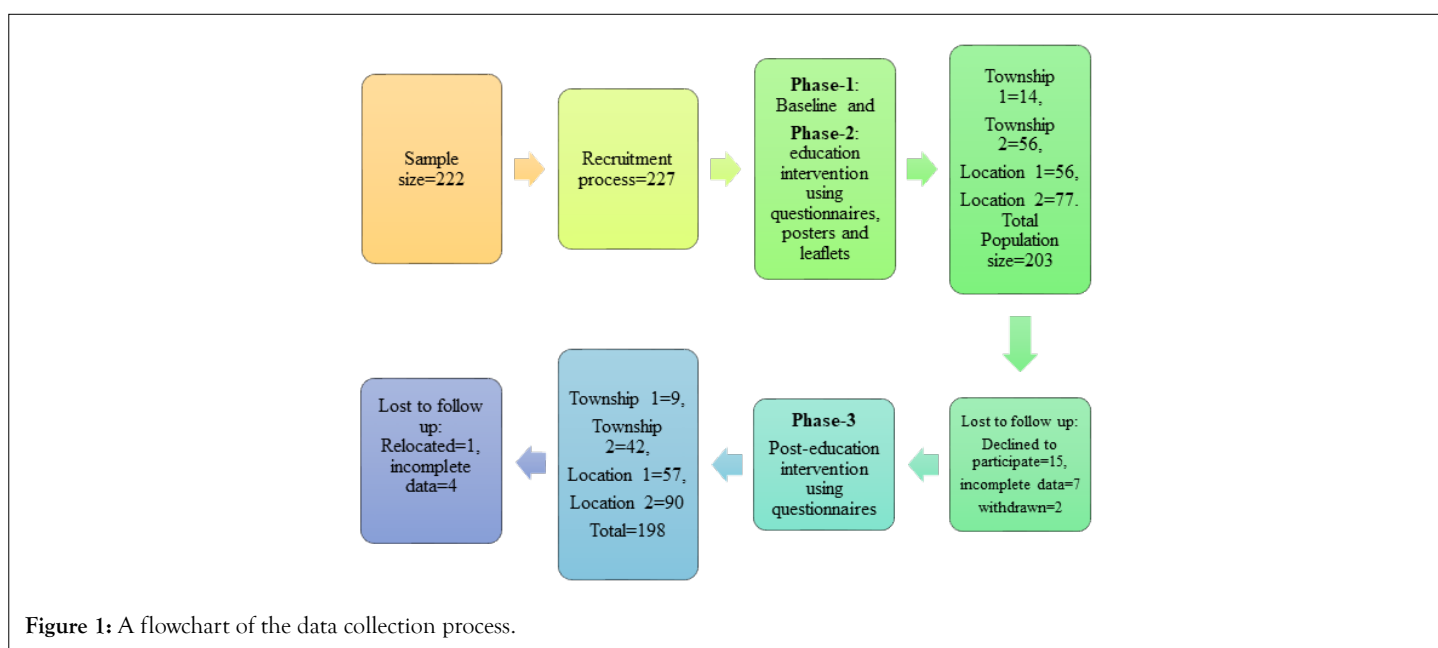


Figure 1: A flowchart of the data collection process.

Overall, there were 203 participants who took part in this study, while five were lost to follow up at the post-intervention stage. Data analysis was performed using IBM SPSS software system (version 28) and the differences between the pre and post-data were evaluated using a dependent sample t-test.

## RESULTS

The study had a total of 203 participants who owned dogs representing 91% of households (203 out of 222 households). Out of the 203 participants, 53.7% were females and 45.8% were males. The majority (76.8%) of participants lived in rural areas, while 23.2% lived in urban areas. Additionally, 32% of respondents came from households with five or six members. In terms of education, 40.4% of participants completed primary school, while 35.5% completed secondary school (Table 1).

**Table 1:** The demographic profile of participants in the study.

Characteristics	Number of participants (n=203)	%
Gender	29 ± 5	29 ± 5
Male	93	45.8
Female	109	53.7
Unanswered	1	0.5
<b>Family size</b>		
1 to 2	14	6.9
3 to 4	39	19.2
5 to 6	65	32
7 to 8	44	21.7
9 to 10	22	10.8
11 to 12	13	6.4
13 to 16	5	2.5
More than 16	1	0.5
<b>Level of education</b>		
Illiterate	30	14.8
Primary	82	40.4
Secondary	72	35.5
Tertiary	18	8.9
Unanswered	1	0.5
<b>Residential area</b>		
Urban	47	23.2

**Table 2:** Knowledge of dog owners regarding rabies pre-and post-intervention.

Questions	Baseline		Post-intervention	
	n=203	%	n=198	%
<b>Do you know about rabies?</b>				
Yes <sup>†</sup>	148	72.9	183	92.4
No	54	26.6	14	7.1
Unanswered	1	0.5	1	0.5
<b>Which of the following signs are seen in dogs with rabies?</b>				
Aggressiveness (biting without any provocation) <sup>†</sup>	128	63.1	156	78.8
Profuse salivation <sup>†</sup>	115	56.7	158	79.8
Craving and chewing something that has no nutritional value (e.g., eating sticks, nails, faeces, etc.) <sup>†</sup>	31	15.3	69	34.8
Difficulty in swallowing	23	11.3	21	10.6

Rural	156	76.8
<b>Physical address</b>		
Unanswered	5	2.5
Location 2	97	47.8
Township 2	51	25.1
Location 1	36	17.7
Township 1	14	6.9

## KAP (Knowledge, Attitudes and Practices) scores

The participants' average knowledge score was 20.7% before the intervention. After the intervention, the score improved to 23.2%, indicating a better understanding of rabies prevention and control among dog owners. The average attitude score was 24.7% before the intervention and 25.4% after the intervention, which suggests a positive attitude among dog owners. However, the average practice score remained stable at 25.0% both before and after the intervention, indicating that participants' practices did not change significantly after the intervention.

## Knowledge about rabies in pre and post-intervention

The study found that most dog owners (86.7%) got annoyed by stray dogs both before and after the intervention. However, the percentage of participants willing to assist dog-bite victims by taking them to the local health facility increased from 61.1% to a higher number after the intervention (Table 2).

In terms of the attitudes of dog owners when their dogs bite people, the majority (61.1%) of participants said they would help the bite victim to seek medical attention at the local health facility before the intervention, but this attitude increased further after the intervention. A few participants said they would safely capture their dog and restrain it by tying it to a fence or tree at baseline and this figure increased after the intervention.

Before the intervention, a majority (54.2%) of the participants recommended killing dogs if the owner and vaccination status were unknown, but this percentage decreased after the intervention. However, a few participants stated that they would keep a dog for ten days to see if the dog was infected with rabies.

The study also found that most participants thought rabies was a dangerous disease compared to their opinions after the intervention.

Roaming over long distances (running for no apparent reason) <sup>†</sup>	49	24.1	43	21.7
Change in sound (e.g., hoarse barking or inability to make sound)	29	14.3	78	39.4
Dropping of the jaw	38	18.7	76	38.4
Scared of water	17	8.4	24	12.1
No coordination	7	3.4	19	9.6
Other, specify	1	0.5	4	2
Don't know	38	18.7	12	6.1
<b>Where did you get information about rabies disease?</b>				
On radio	27	13.3	23	11.6
Public meeting	23	11.3	35	17.7
Neighbour	64	31.5	45	22.7
Newspapers, books	6	3	3	1.5
Para-veterinarians, also known as Animal Health Technicians (AHTs)	47	23.2	58	29.3
School	13	6.4	10	5.1
Others specify	32	15.8	38	19.2
From which of the following animals you can get rabies?	NG	NG	NG	NG
Dogs <sup>†</sup>	188	92.6	183	92.4
Sheep	6	3	1	0.5
Goats	2	1	2	1
Cows	2	1	3	1.5
Cats <sup>†</sup>	42	20.7	71	35.9
Pigs	10	4.9	4	2
Rabbits	4	2	0	0
Jackals <sup>†</sup>	5	2.5	1	0.5
Other, specify	2	1	0	0
How rabies is transmitted from dogs and other animals including humans?	NG	NG	NG	NG
Bite <sup>†</sup>	179	88.2	188	94.9
Licking of wound <sup>†</sup>	16	7.9	16	8.1
Scratching <sup>†</sup>	14	6.9	12	6.1
Food	0	0	2	1
Licking of intact skin	8	3.9	10	5.1
Others, specify	0	0	0	0
<b>What is your opinion about dogs showing clinical signs of rabies?</b>				
They can be treated successfully	71	35	53	26.8
They always die <sup>†</sup>	76	37.4	116	58.6
Don't know	55	27.1	27	13.6
Unanswered	1	0.5	2	1
<b>What do you think about people showing clinical signs of rabies?</b>				
They can be treated successfully	82	40.4	70	35.4
They always die <sup>†</sup>	54	26.6	94	47.5
Don't know	67	33	34	17.2
What is the most effective method of controlling rabies in dogs and cats?	NG	NG	NG	NG
The killing of stray dogs	43	21.2	23	11.6
Restriction of dog movements	23	11.3	18	9.1
Regular vaccination <sup>†</sup>	137	67.5	155	78.3
Castration	0	0	2	1

**Note:** <sup>†</sup> Desirable responses given by respondents.

### Participants attitudes toward rabies during pre and post-education

Participants' attitudes towards rabies pre and post-intervention showed most dog owners (participants) (86.7%) got annoyed by stray dogs in both interventions, while most participants (61.1%) were willing to assist dog-bite victims by taking them to the local health facility to seek medical attention in the pre-test, a factor which increased during the post-intervention phase (Table 3).

Regarding the attitudes of the dog owners when their dogs bite people, the baseline results showed that the majority (61.1%) of the participants would help the bite victim to seek medical attention

at the local health facility; and that attitude increased in the post-intervention. A few participants said they would safely capture their dog and restrain it by tying it to a fence or tree at baseline and this figure increased in post-intervention.

Among the participants interviewed, a majority (54.2%) recommended killing dogs, if the owner and vaccination status were unknown during pre-intervention, this decreased during post-intervention. However, a few of the participants stated that they would keep a dog for 10 days to see if the dog was infected with rabies. A large proportion of participants' pre-intervention analysis indicated that they thought rabies was a dangerous disease compared to their opinions post-intervention.

**Table 3:** Attitudes of dog owners towards rabies in the study area.

Parameters	Parameters			
	Baseline		Post-intervention	
	N=203	Score %	N=198	Score %
<b>Do you get annoyed with stray dogs?</b>				
Yes	176	86.7	177	89.4
No	17	8.4	11	5.6
Total	193	95.1	188	94.9
Unanswered	10	4.9	10	5.1
<b>What should you do with the dog if it has bitten a person?</b>				
Help the bitten victim to go to the local health facility	124	61.1	137	69.2
Capture your dog if this can be done safely and restrain your dog by tying it to a fence	35	17.2	70	35.4
Locking it in a room	39	19.2	20	10.1
Contact para-veterinarian	20	9.9	13	6.6
Local authorities	4	2	0	0
Do nothing	3	1.5	0	0
<b>If a dog bites a person or an animal, what would you wish to happen to the biting dog if it is caught?</b>				
Immediate release if the owner is known and the dog is vaccinated	28	13.8	21	10.6
Direct killing, if the owner and vaccination status is unknown	110	54.2	85	42.9
Keep the dog for 10 days to see if it is rabid, regardless of its vaccination status	62	30.5	92	46.4
Unanswered	3	1.5	0	0
Total	203	100	198	100
<b>In your own thinking, how best can we control rabies?</b>				
Regular vaccination of dogs	132	65	162	81.8
Complete restriction of dogs	27	13.3	7	3.5
Education of the public	18	8.9	22	11.1
Killing stray dogs	16	7.9	7	3.5
Regular vaccination of people at risk (e.g., veterinarians)	1	0.5	0	0
Post-exposure prophylaxis	9	4.4	0	0
<b>Do you think rabies is a dangerous disease?</b>				
Yes	198	97.5	196	99
No	2	1	1	0.5
Unanswered	3	1.5	1	0.5
Total	203	100	198	100

## Practices for rabies prevention and control

Participants were assessed on action taken if their neighbor got bitten by a dog before being taken to the healthcare facility. The evidence of the present study indicated that the participants had poor practices concerning first aid. The majority stated that they would wash the wound thoroughly with water alone or with water and soap (Table 4).

The pre-intervention results showed that most of the participants (76.4%) would take their dog(s) to a site during the vaccination campaign which increased post-education intervention. At least a few

of the participants in the pre-test indicated that they did not vaccinate their dogs, a number which decreased during post-education intervention. The majority mentioned Para-veterinarians, also known as Animal Health Technicians (AHTs) as the ones who vaccinated their dog's pre-intervention which increased in post-education intervention, while a small proportion of participants did not even vaccinate their dogs as indicated before the intervention, a factor that slightly decreased post-intervention. The majority of the participants would go to health facilities to seek medical treatment after a dog bite, but a few participants still trusted traditional healers or homemade herbs for medical treatment against rabies.

**Table 4:** Practices of dog owners regarding rabies control pre and post intervention.

Questions	Baseline		Post-intervention	
	n=123	%	n=198	%
<b>If your neighbour is bitten by a dog, what can you do before you take him/her to a healthcare facility?</b>				
Thoroughly wash the wound with water alone or with soap if available <sup>†</sup>	65	32	70	35.4
Cover the wound with dressings and bandages	27	13.3	14	7.1
Apply salt to the wound	7	3.4	25	12.6
Take a patient to the health care facility without doing anything	45	22.2	32	16.2
Apply 70 % alcohol to the wound	52	25.6	55	27.8
Apply other types of antiseptics to the wound, specify	6	3	2	1
Unanswered	1	0.5	0	0
<b>Do you bring your dog(s) for vaccination against rabies?</b>				
Yes <sup>†</sup>	155	76.4	167	84.3
No	40	19.7	31	15.7
Unanswered	8	3.9	0	0
<b>How old was your dog at the first vaccination?</b>				
Younger than or 3 months old	33	16.3	26	13.1
Older than 3 months <sup>†</sup>	72	35.5	94	47.5
Don't know	96	47.3	77	38.9
Unanswered	2	1	1	0.5
<b>How do you proceed to have your dog(s) vaccinated?</b>				
Take a dog to a site during the campaign for vaccination <sup>†</sup>	109	53.7	144	72.7
Wait for a veterinarian to come to my home	34	16.7	8	4
Both approaches	13	6.4	11	5.6
Take the dog to a veterinary clinic <sup>†</sup>	9	4.4	1	0.5
I do not vaccinate my dogs	38	18.7	34	17.2
<b>Who vaccinates your dog (s)?</b>				
Private veterinarians	19	9.4	5	2.5
Para-veterinarians, also known as Animal Health Technicians (AHTs) <sup>†</sup>	141	69.5	158	79.8
I do not vaccinate my dogs	40	19.7	35	17.7
Unanswered	3	1.5	0	0
<b>How did the Para-veterinarian also known as Animal Health Technicians (AHTs) who vaccinated your dog last time carry the vaccine?</b>				
In a cooler box <sup>†</sup>	141	69.5	157	79.3
On ice without a cooler box (e.g., in a plastic bag)	8	3.9	5	2.5
The vaccine was purchased and carried on ice by "the dog owner" and then administered by a para-veterinarian	12	5.9	2	1
I do not vaccinate my dogs	42	20.7	34	17.2

Have you been bitten by a dog?				
Yes <sup>†</sup>	87	42.9	87	43.9
No	113	55.7	111	56.1
Unanswered	3	1.5	0	0
Where did you seek medical treatment from?				
Health facility <sup>†</sup>	73	83.9	71	81.6
Traditional healer	14	16.1	16	18.4

Note: <sup>†</sup> Desirable responses given by respondents.

## DISCUSSION

This study aimed to assess the impact of a health education intervention on rabies prevention and control of KAP among dog owners in Eastern Cape, South Africa.

### Demographic characteristics

The study had a total of 203 participants. Among the participants, 53.7% were females and 45.8% were males (Table 1). A similar study conducted in Chennai had 58.3% females and 41.7% males as participants [15]. However, conducted a study in Namibia which had a different result than the current study [16]. In their study, 53.2% of the respondents were males. This could be because most households in the study area were headed by women and men were at work during the data collection period of this study.

### Comparison of pre and post-intervention KAP scores

After the educational intervention, there was a significant increase in the scores for Knowledge, Attitudes and Practices (KAP), especially in the domain of knowledge on rabies symptoms. The study also found that participants were more likely to help a bitten victim get to a local health facility. Similar results were obtained in a study conducted in Chennai, which also showed a significant improvement in the total KAP scores after the health education intervention. These findings suggest that educational programs on rabies are essential in the study area and the health education intervention was effective in improving dog owners' knowledge, attitudes and practices towards rabies.

### Knowledge of participants on rabies

The evidence of the current study showed that although average participants (21.4%) were aware of rabies and its signs and symptoms at baseline, there was a significant increase to (30.3%) in the knowledge of participants on rabies post-education intervention. The study looked at knowledge of participants within the study area. When it compared the dog ownership between participants from rural and urban areas, the results showed that in the urban area, most participants kept the dogs for security purposes and only a few of them were found to own dogs accidentally. In this instance, the dogs just came into a particular household without agreement between the owners, but they stayed since they often found food left over. In rural areas, majority agreed that they kept the dogs for security purposes as well, while some of them used dogs for hunting sometimes. Few of them mentioned herding other animals. For example, herding is when a dog tries to control where an animal goes.

The study further showed that most households had no proper fencing in urban areas (townships) to ensure that the dogs were locked inside the yard. This may probably explain why the dogs were

freely roaming around the streets and therefore some household heads found themselves in a position of owning dogs unexpectedly. A similar environmental factor that may have contributed to the spread of rabies in rural areas was the fact that some other households were situated close to the bush areas which meant that there might be an interaction between wildlife and domestic dogs [16].

Similar results were established in the study by Singh et al., and Veary et al., where participants had adequate awareness about prophylaxis, (42.4%) and programme guidelines (70.8%) pre-intervention [17,18]. The evidence of the previous results showed that there had been substantial improvement in knowledge post-intervention among the study participants in epidemiology (93.1%), prophylaxis (97%) and programme guidelines (93.8%) domains.

Furthermore, this study revealed that most participants kept dogs for security reasons, suggesting that dogs played an important role in an individual's household, especially during the night since they bark to alert the owner(s) attention when an intruder comes towards their house. Whereas some of them kept the dogs for hunting, few of them kept the dogs for herding livestock and only a few of them reported that they kept dogs unintentionally. Similar results were recorded in a study conducted in Namibia, where it was revealed that a few of the participants were keeping dogs for meat production [19].

### Attitudes towards rabies

Findings from this study showed that the participants' attitudes toward the prevention and control of rabies changed significantly post-education intervention.

The attitude towards rabies during pre and post-intervention of the majority of participants was that they got annoyed with stray dogs. The discussion produced evidence that the participants portrayed good attitudes since most (65%) of them agreed that they brought their dogs for vaccination at baseline, a percentage that increased to (81.8%) post-education intervention. A few (7.9%) of them did not agree at baseline and (3.5%) during post-education intervention. These findings correspond with those from a study by, who established that more than 98% of the respondents were willing to vaccinate their pets. These findings can further be supported by a study conducted in Namibia, where 87% of dog owners understood the importance of dog vaccination for rabies prevention and control.

Furthermore, the participants had a feeling that vaccinating dogs would reduce the level of spread of rabies in their community and therefore the risk of human rabies would also be reduced. This could be supported by the fact that the Department of Rural

Development and Agrarian Reform (DRDAR) through Veterinary services in the O.R. Tambo district conducts vaccination campaigns twice a year.

Moreover, the evidence of the current study showed that most of the participants preferred to visit the health facility to seek medical attention following a dog bite. Similarly, the study conducted in Namibia found that 91% of the respondents did seek medical attention from the nearest medical center [19]. This might be the fact that dog owners understood that homemade remedies are not effective for rabies treatment compared to medical remedies from health facilities.

### Practices toward rabies prevention and control

Participants knew that a dog-bite victim should be taken to the health facility and the first aid measures should be considered as well. Participants were assessed on action taken if their neighbor got bitten by a dog before being taken to the healthcare facility. Findings of the pre-test showed that only 32.0% said they could thoroughly wash the wound with water alone or with water and soap if available before they could take the victim to a healthcare facility. The pre-intervention results showed that 53.7% of participants took their dog(s) to a site during the vaccination campaign.

Out of 203 participants, 69.5% reported that their dogs were vaccinated using a cooler box, while 20.7% did not vaccinate their dogs. Failure to vaccinate could lead to a resurgence of rabies in areas where it has been successfully controlled.

Some participants believed that applying salt to dog bite wounds could help, but this is a misconception. The evidence of these results was reinforced by the results obtained in the KAP study conducted by in which wound washing of dog-bite victims was disclosed by the majority (91.3%) of the participants, following the intervention [20]. In a previous study conducted, it was found that the level of knowledge regarding first-aid measures increased from 75.2% to 96.6% following an educational intervention [21]. Another study also reported similar findings, with 97% of participants stating that they would clean a wound with water and soap [22]. The study revealed the misconception that 32.8% of participants had thought that eating roasted meat of animals that had died of rabies could be medicine for rabies. The results of the study were further supported by those who recorded that 54.8% used traditional healers after first aid and 42.1% contacted health facilities.

### CONCLUSION

The study found that the education intervention program on rabies was effective in improving the knowledge, attitudes and practices of dog owners regarding rabies. The dog owners' knowledge, attitudes and practices improved significantly in all areas after the implementation of the program. The study also revealed that there was no significant gender-related relationship between dog owners and their knowledge, attitudes and practices before and after the implementation of the program. However, there was a significant relationship between the dog owners' place of residence, education and their knowledge, attitudes and practices about rabies.

Veterinary services should strengthen rabies awareness programmes by implementing health education on rabies in villages, schools and rural communities. It is recommended that public platforms such as community meetings, churches, markets, schools, shops, billboards, radio and television be utilized to disseminate rabies control messages to the public.

To eliminate rabies in communities, rabies vaccination teams should be established to conduct annual mass dog vaccination campaigns and promote health interventions from house to house in Ngquza Hill Municipality, as well as other municipalities in the Eastern Cape Province. This will increase awareness, enhance knowledge and encourage dog owners who do not usually vaccinate their dogs for rabies to do so during the campaign.

The Department of Health should ensure the availability of Post-Exposure Prophylaxis (PEP) at public health facilities continuously and discourage the use of homemade remedies in human rabies treatment. This approach would help control other human diseases that may exist within the communities.

It is important to carry out further research on the younger generation in schools since they are the group most vulnerable to rabies. Additionally, it's important to extend the intervention to larger communities and conduct long-term assessments to evaluate its impact. Furthermore, it's necessary to study the prevalence of rabies before and after implementing the intervention.

### ETHICAL CONSIDERATIONS

Prior to the commencement of data collection, ethical approval was obtained from the Research Ethics Committee-Human (REC-H) at Nelson Mandela University under reference number: H20-HEA-ENV-005. Additionally, permission was granted from community leaders in the study area to conduct the study. During door-to-door visits, participants were given detailed information about the study and provided with informed consent. The participants were given written information about the study, which was then verbally explained in their language during a face-to-face meeting.

### ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by Nelson Mandela University Faculty Postgraduate Studies Committee (FPGSC) Health Sciences.

### CONSENT FOR PUBLICATION

All authors participated in the study and concurred with the submission and subsequent revisions of the manuscript.

### AUTHORS CONTRIBUTIONS

Mfundelwa Wilbert Zangwa, Jimmy Hussein Kihara, Paula Ezinne Melariri: Conceptualized the study. Mfundelwa Wilbert Zangwa, Jimmy Hussein Kihara, Paula Ezinne Melariri, Wilma Ten-Ham-Baloyi: Designed the study. Mfundelwa Wilbert Zangwa: Data collection and fieldwork. Kirstie Eastwood, Opeoluwa Oyedele, Mfundelwa Wilbert Zangwa, Wilma Ten-Ham-Baloyi, Jimmy Hussein Kihara, Paula Ezinne Melariri: Data processing and analysis. Kirstie Eastwood, Opeoluwa Oyedele, Mfundelwa Wilbert Zangwa, Wilma Ten-Ham-Baloyi, Jimmy Hussein Kihara and Paula Ezinne Melariri: Data interpretation. Mfundelwa Wilbert Zangwa and Jimmy Hussein Kihara: prepared first draft of the manuscript. Mfundelwa Wilbert Zangwa, Jimmy Hussein Kihara, Wilma Ten-Ham-Baloyi, Opeoluwa Oyedele and Paula Ezinne Melariri: Reviewed the study.

All authors contributed to developing the final manuscript and approved its submission.



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